Camelbak Products, LLC – In-Line Microfilter

www.camelbak.com

Device Information

The Camelbak Products, LLC, In-Line Microfilter is designed for use with commercial hydration packs. The In-Line Microfilter contains a 0.2 µm hollow fiber polysulfone membrane bundle primary filter and a carbon block prefilter. The hollow fibers are packed into a plastic housing and the open ends are oriented at the effluent side of the housing. The filter cartridge is contained in a sturdy plastic housing with separate inlet and outlet for connecting to the drink tube of a hydration pack. Water flows into the filter housing, through the carbon prefilter, then from the outside of the hollow fibers to the inside, and out of the open ends of the hollow fibers. The top of the hollow fiber filter cartridge is sealed with a hard epoxy with the open end of the hollow fibers flush with the epoxy surface; this forces water to flow into the hollow fibers for purification. The device, as purchased, includes the filter housing with quick release fittings attached, primary hollow fiber filter, two carbon prefilters, and an extra set of quick release fittings. The extra fittings allow for the microfilter to be spiced into Non-Hydrolink hydration pack reservoirs (e.g., hydration pack reservoirs without quick release fittings). This device is not marketed for virus reduction and will therefore require additional treatment.

Effectiveness Against Microbial Pathogens

No laboratory testing data was received challenging this device for pathogen reduction, such as following the U.S. Environmental Protection Agency (USEPA) Guide Standard (reference 1). General knowledge of carbon block and membrane filtration (references 2) indicate that this device should be capable of consistently meeting the minimum 6-log bacteria reduction, and 3-log reduction for *Giardia* cysts and *Cryptosporidium* oocysts as stated in reference 1. This device is not expected to consistently reduce viruses (4-log reduction). Based on general knowledge of size exclusion by membrane filtration, the Camelbak Products, LLC, In-Line Microfilter is assigned one √ for bacteria reduction, one √ each for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts. The device receives an X for virus reduction (for an explanation of the rating checks click here).

Table. Expected Performance Against Microbial Pathogens.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	√	size exclusion
Viruses	> 4-log	X	-
Giardia cysts	> 3-log	√	size exclusion
Cryptosporidium oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is an in-line filter, the actual production rate is dependent on the user. The production capacity is stated by the manufacturer to be up to 284 L, however, production capacity will vary widely with raw water quality (e.g., turbidity). No data was received indicating the performance of this device in turbid waters.

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filters (prefilter and primary). Device instructions state to rinse the prefilter as flow decreases. When the prefilter becomes clogged it must be replaced. The device is accompanied with two prefilters. After using the two prefilters until clogged, the manufacturer states to discard the complete device. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight (no accessories or tubing)	160 grams (estimated)
Size (height x diameter)	23 cm x 4 cm

Cost

Inline filter	$55.00

Device Evaluation

No data was received that challenged the Camelbak Products, LLC, In-Line Microfilter against microbial pathogens such as stated in the USEPA Protocol (reference 1). General knowledge of size exclusion by membrane filtration indicates that this device should be capable of consistently reducing bacteria, *Giardia* cysts, and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1. This device is not expected to consistently reduce viruses (4-log). Additional treatment is necessary to reduce viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the water. This device contains a carbon block prefilter to reduce particulate matter and reduce source water taste and odor. Since no data was received, there is no indication of the long term efficacy of this filter against pathogens or preventing clogging from turbid water. Use in turbid water is expected to clog the prefilter rapidly. Since the device is not able to be backwashed to remove accumulated particles, once clogged, the filter must be replaced. Once the device has been used, flow direction should not be reversed or cross contamination may occur. There is no indicator of process failure or end of device useful life.

Advantages

- Expected to consistently provide adequate protection from bacteria, *Giardia* cysts, and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA Protocol was not received.
- No wait time prior to consumption.
- Simple and effective.

Disadvantages

- No data testing this device against the USEPA Protocol (reference 1).
- Not expected to be consistently effective against viruses.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.